36 hours. During daylight on the 23rd there was an Aurora Borealis which continued till 1 A.M. of the 24th; at 7 A.M. rain commenced.

Highfield House Observatory, June 24 E. J. LOWE

(3.) *Seen near Burton-on-Trent, June* 23.

The rare and beautiful phenomenon of parhelia was seen by many observers in this neighbourhood at about seven o'clock on the evening of the 23rd inst., and it continued to be visible for more than a quarter of an hour.

The horizontal bar of light, the coloured halo, and the intensified light at the intersections, as also a portion of the upper bow, were all seen very distinctly. The temperature of the atmosphere at the time was rapidly lowering, and during the night a considerable quantity of rain fell.

I presume that the phenomenon was very local, as I have seen no notice of its occurrence in any of the daily papers to which I have had access.

Burton-on-Trent, June 25 EDWIN BROWN

Natural History of Celebes

It will be, perhaps, not without interest to the readers of your periodical to receive the information that I am leaving for Celebes, on a natural history expedition, at the beginning of July, to stay there for a considerable time with the purpose of exploring first this interesting and little known island as far as possible, and this done, the islands in the neighbourhood.

I shall be happy to learn the wishes and supply the desiderata of any naturalist who takes a special interest in the fauna or flora of the island. Letters will reach me Poste Restante, Menado, Celebes.

I have just finished the translation and publication of Mr. Wallace's "Contribution to the Theory of Natural Selection."

ADOLF BERNHARD MEYER

12, Victoria Road, Kensington, London, W., June 28

Fertilisation of the Barberry

C. K. SPRENGEL, in his *Entdeckte Geheimniss der Natur im Bau und in der Befruchtung der Blumen*, gives an excellent account of the structure of the Common Barberry, *Berberis vulgaris*, and points out how it is visited by insects, and how, upon the touch of an insect's limb or proboscis, the irritable filaments move inwards, and press the opened anthers against the stigma. It is needless to recapitulate the details of structure and movements of a plant so well known, but I venture to think that there is a function and a purpose beyond those which Sprengel's ingenuity has pointed out. Sprengel's great object was to show how insects and flowers mutually help one another, and, consequently, when he had shown that the anther could not shed its pollen on the stigma until the filament was touched by an insect, and that, when so touched, the open anther became pressed against the stigma, he was satisfied. He does not seem to have been fully alive to the wider generalisation made by Mr. Darwin, that this relation of insects to flowers serves the purpose of crossing by fertilising the stigma of one flower with pollen taken from another. At any rate, in this case he has been content with the ingenuity of the apparatus for self-fertilisation through the instrumentality of an insect.

But there are one or two circumstances which seem to show that there is something further in this curious motion of the stamens of the Barberry.

In the first place, each filament only moves when touched at a particular spot near its base, where a very slight touch—*e.g.*, with a human hair—will make it start up. The other stamens remain unmoved, and a bee will frequently visit the flowers and carry off the abundant nectar without moving any stamen at all.

In the second place, after the stamen has moved inwards, which it does rapidly and with a sort of jerk, it soon begins again to move slowly outwards and backwards, and in a short time recovers its original position. Pollen still remains in the anther cells, and the stamen is ready again to jump up towards the stigma on the visit of another insect.

Now these two facts are not explained, if the sole object of the movement of the stamens is self-fertilisation. Why in that case should each stamen move separately when gently touched on its inner side, and why should it return to its original place, instead of remaining with its whole mass of pollen firmly pressed against its own stigma? Why, too, should it move inwards rapidly, and retreat slowly?

But if the object be to enable the insect to carry pollen to another flower, these facts, as well as the remarkable points of structure and function noticed by Sprengel and others, are all explained.

The separate stamen moves when touched on its inner side by the thin proboscis or limb of an insect, in such a way as to leave its pollen on that limb or proboscis, or on the body of the insect, which will then generally be interposed between the anther and the stigma. And the stamen returns to its place after the insect has departed laden with pollen to other flowers, in such a way as that, when more nectar has been deposited and another insect comes and touches it, it may again spring up and deposit some of its remaining pollen on that insect, to be again carried by it to fresh flowers.

If this be so, the function of the whole apparatus is not to cause self-fertilisation, but to enable insects to carry pollen from one flower to another. The case is curious, because at first sight the very remarkable movement of the stamens in this plant certainly looks like an ingenious device for *self-fertilisation*, and as such, an argument against the crossing theory.

Mr. Darwin, to whom I have mentioned this, tells me in confirmation, that the North American Barberries (*Mahonia*) have become so much crossed that it is almost impossible in this country to procure a true specimen of the two or three forms originally introduced. T. H. FARRER

The Corona

I DO not think Dr. Gould's lucid account of his own views could have been misunderstood. I, at least, who replied to him, understood him in the sense in which he has written to you.

The chief question at issue has been, whether there is or not *anything at the sun* (to use Dr. Gould's expression, as, on account of its very vagueness, most suitable), *outside the prominences.* Mr. Lockyer has said *no*; I and others have said *yes*; and Dr. Gould has helped to prove we were right. It has always seemed to me, however, that the photographs taken by Mr. De La Rue and Fr. Secchi, in 1860, had settled the question.

The question relating to matter outside this brilliant appendage, is of less moment. We know certainly that during totality there is *some* light in our atmosphere, and the question where this begins or ends is more interesting to the meteorologist than to the astronomer. But I would invite Dr. Gould's attention to the fact that in the March number of the Astronomical Society's *Monthly Notices*, I have given a simple mathematical proof of the fact that no atmospheric light *can* come in any considerable total eclipse from any region of the sky within seven or eight degrees of the eclipsed sun.

So far as this proof is concerned, I cannot admit that the matter is one of theory at all. But my views as to the *nature of the material* producing this coronal light are not founded on absolutely certain evidence, though the evidence in their favour is very strong indeed. Moreover, I should expect that precisely those appearances would be seen which Dr. Gould regards as tending to show that the faint coronal light arises from something *which is not at the sun.*

But really where a mathematical demonstration of a fact is extant, the consideration of arguments derived from admittedly doubtful evidence seems a mere waste of time. It may as readily be shown that the three angles of a triangle are not equal to two right angles, as that in the Indian or American eclipses atmospheric glare could have been visible within seven or eight degrees of the eclipsed sun.

In the supplementary number of the *Notices* of the Astronomical Society, I hope to give a further explanation of the extremely simple proof on which my views depend; and (because all questions involving considerations of tri-dimensional space are perplexing to most non-mathematicians) I am having a mechanical figure constructed to make the matter clearer, in illustration of papers I hope to read at the next meeting of the British Association, and next November before the Astronomical Society.

RICHARD A. PROCTOR

South Lambeth, June 24

Euclid as a Text-book

THE suggestion of Mr. Levett with regard to the formation of an Association for securing a general reform in the teaching of geometry, is worthy of being at once carried out. Such an

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association would show how general amongst teachers is the dissatisfaction with the ancient methods, and might lead to more uniformity of practice by securing a free public discussion of the best methods and most suitable terms. There are abundant materials available as the basis of discussion, and no doubt the aid of the most distinguished geometers would be easily secured by the Association, so as to bring about a decision on controvertible points. Several English text-books are already in existence, and there are many good features as well as many defects in all of them. Excellent series of lectures have lately been given on the subject in London and Cambridge, and some of the lecturers have printed very full notes for the use of their students. The syllabuses of Mr. Clifford, and Professor Hirst, are very suggestive.

After an exhaustive discussion, the Association would doubtless be able to secure the publication of a text-book which would have the approval and patronage of all its members. If the readers of NATURE who approve of the plan, would send their names to Mr. Levett, with contributions, if possible, towards expenses of printing, postage, and advertisement, some practical result would soon ensue.

Brixton RICHARD WORMELL

Storms and Fishes

CAN any of your readers give me any information on the following subjects?

1. What is Le Verrier's law of storms?

I asked this question some months ago, but no one replied to it.

2. Have any articles or special works on Poisonous Fishes appeared since Dumeril's memoir on the subject?

I should also be obliged to anyone who can give me information regarding fresh-water fishes that are in the habit of attacking bathers. Don Paez describes such fishes in some of the South American rivers. M.D.

The Scientific Education of Women

WILL you kindly allow me to add some information to an article which I have just seen in NATURE of June 16, on the Scientific Education of Women? First, however, allow me to correct an error which was made in an article on Lectures to Ladies, which I observed in NATURE some months ago, in which it was stated that the first series of educational lectures to women given under the auspices of any society for such lectures, was given under the direction of the Edinburgh Ladies' Educational Association. The fact is, that the first series of lectures of that kind, in recent years, was given in Liverpool, Manchester, Leeds, and Sheffield, under the auspices of the "North of England Council for the higher Education of Women." These lectures were given in the Autumn of 1867. The subject was Physical Astronomy. Under the auspices of that society, as well as of other societies, many sets of lectures have been given since that time on subjects connected with Physical Science. But I have always regretted, as the writer of your article regrets, that a greater number of the lectures have not been on such subjects, for I have always found that women exhibit a peculiar aptitude for the study of Physical Science. I have also found in my own experience a considerable desire on the part of women for such studies; and I believe that the fewness of such courses of lectures to them is to be put down to the scarcity of people at once competent and willing to teach them such subjects. From all that I have seen there is in my mind no doubt that the desire for true scientific instruction throughout the country, both among women and among men, exceeds the present possibility of supplying that teaching. I called your attention to this fact some months ago, and I believe that we cannot over-estimate its significance.

With respect to the remarks made in your article as to the medical education of women, it may interest your readers to know that Cambridge, which has moved so much in the matter of women's education, has not been behind-hand in this; but that a few weeks ago a petition went up to parliament praying that, in the ensuing legislation for the medical profession, provision might be made to prevent the exclusion of women from that profession. This petition was from resident graduates, and one hundred names were attached, among which were those of two heads of houses, nine University professors, and thirty-eight tutors or assistant-tutors of Colleges.

In your notice of the exhibitions in connection with the lectures to women at Cambridge, you speak of the Cambridge higher examinations for women. These examinations, which were instituted last year for women over eighteen years of age, were suggested to the University by a memorial presented by the North of England Council for the Higher Education of Women, a body to whose exertions the whole of this cause is deeply indebted. JAMES STUART

June 22

ILLUMINATION OF THE SEA

THE following is derived from the *Kölnische Zeitung* of June 19:—

"Gulf of Siam, April 11

"Last night, between two and three o'clock, I had the opportunity of witnessing an illumination of the sea of the most peculiar kind. It had become quite calm, after a sharp breeze which had sprung up from the N.N.W., caused by a passing storm in the distance. Heat-lightning was still very frequent in the west horizon, and the sky was covered with light clouds, through which the moon shone rather brightly. We took in sail and set the engines going. I then noticed in the water large white flakes which I had at first taken to be reflections of the moon; they were about a fathom in diameter, apparently lustreless, and of no particular shape, like objects seen lying deep in the water. By the rising and falling of the sea's surface these flakes floated off to a short distance from the ship without imparting any noticeable increase of brightness to the water illuminated by the moon's rays. After steaming further forward for six or seven knots, a most wonderful spectacle presented itself. On both sides obliquely in front of us, long white waves of light were seen floating towards the ship, increasing in brightness and rapidity till at last they almost disappeared, and nothing was observed but a white lustreless, whirling (*schwirrendes*) light upon the water. After gazing for some time it was impossible to distinguish between water, sky, and atmosphere, all which were but just now clearly distinguishable, and a thick fog in long streaks appeared to be driving upon the ship with furious swiftness. The phenomenon of light was somewhat similar to that which would be produced by the whirling round of a ball striped black and white so rapidly that the white stripes seem to be lost and blended with the dark ones. The light was just as if we were enveloped in a thick white fog. The direction of the waves of light upon the ship was always on both sides obliquely from the front. The phenomenon lasted about five minutes, and repeated itself once more afterwards for about two minutes. Without doubt, therefore, shoals of small creatures in the water were the cause of this luminosity, and the waves of light find their cause, according to my conviction, in the white flakes above described. Yet their moderate velocity of 1½ geog. mile per hour, and the weak light at first emitted by each flake, so weak as not to influence the tint of the surface-water, does not seem calculated to call forth a phenomenon of such magical effect as the one described. The luminous appearance commonly seen in the wake of a ship, or in water disturbed by oars or rudder, is not to be compared with such a phenomenon as the above. In the former the light is lustrous, glaring green and blue, like phosphorus, often very splendid in deep clear water, mingled with a reddish white foam. We saw a beautiful instance of this kind one night, in perfectly still and smooth water, in a lonely bay of Nipon. It was pitch dark and perfectly quiet, when a heavy shower of rain came on, in large but not dense drops. Every drop as it struck the water became illuminated, little drops of fire sprang up in the air, and a little luminous circle formed itself. It seemed as if the bay was suddenly filled with little flowers of fire. This phenomenon was almost immediately dissipated by a puff of wind."